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For these starfishes we are indebted to the United States National Museum. They form part of a much larger series carefully selected for us by Mr. Austin H. Clark. The other specimens of the series are yet to be analyzed. These four, however, fall into place with the Tobago echinoderms and with those previously published. The progressive enrichment in magnesia, following increase of temperature, is unmistakable.

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[1] This paper is here published by permission of the Director of the United States Geological Survey.

[2] Clarke and Wheeler, *Washington, U. S. Geol. Surv., Profess. Paper*, No. 102, 1917.

ON UTILIZING THE FACTS OF JUVENILE PROMISE AND FAMILY HISTORY IN AWARDING NAVAL COMMISSIONS TO UNTRIED MEN

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Read before the Academy, April 17, 1917

We are about to organize an army of 1,000,000 men and to add greatly to our navy. Within the next few months, over 20,000 commissions will be given, largely to men who have never seen service. It is of primary importance to the conduct of this war that they should be properly selected. In our civil war incompetence of officers was responsible for thousands of unnecessary deaths.

In the past, appointments have been made largely as political favors, a very bad method of selecting. As Mahan says: "In the stringent and awful emergencies of war, too much is at stake for easy tolerance." In this paper I suggest a new method of selection in its particular application to untried naval officers. This method is, in brief, the utilization, among other data, of the facts of juvenile promise and family history.

The basis of this paper is the study of the biographies of 30 naval officers, and genealogies and supplementary data relating to their families. It appears at once that naval officers are of different types—there are naval fighters (like Nelson, Farragut, Porter and Cushing), naval explorers (like Sir John Franklin, McClintock, and our own Wilkes), naval inventors (like Dahlgren), naval diplomats (like Hornby) and so on. Of the 30 officers 14 are clearly *fighters*, and these are utilized in this study.

The essential traits of successful fighting naval officers are (*1*) *Love of the sea*—perhaps an elementary instinct, but not yet fully studied: (*2*) *nomadism*, whose inheritance is known to be sex linked; (*3*) *hyperkinesis*, which is inherited as a dominant trait: i.e., does not skip a

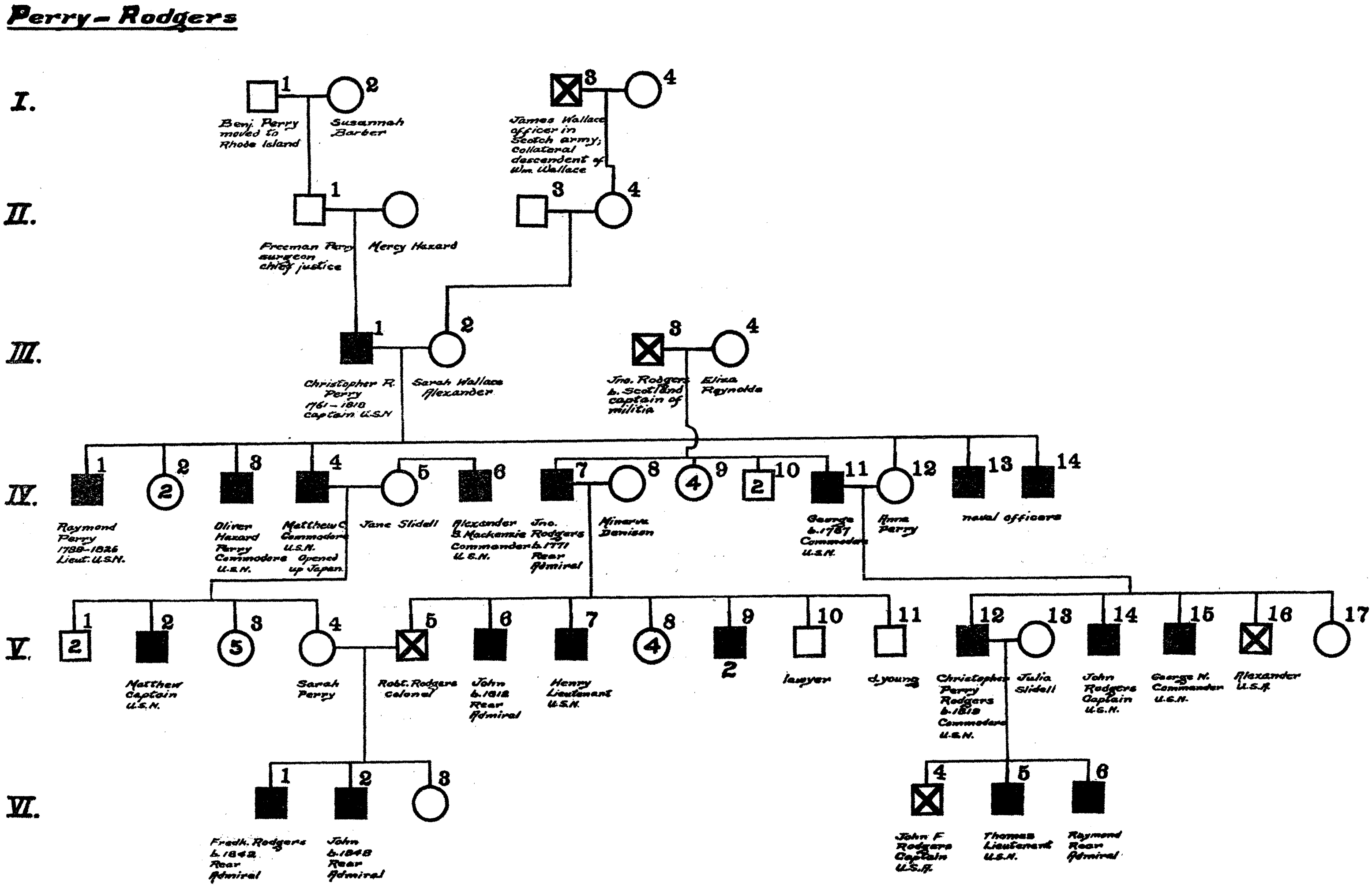
Perry-Rodgers
I.
II.
III.
IV.
V.
VI.
Benj. Perry moved to Rhode Island
Susannah Barber
James Wallace officer in Scotch army; collateral descendent of Wm. Wallace
Freeman Perry surgeon chief justice
Mercy Hazard
Christopher R. Perry 1761–1818 captain U.S.N
Sarah Wallace Alexander
Jno. Rodgers b. Scotland captain of militia
Eliza Reynolds
Raymond Perry 1788–1826 Lieut. U.S.N.
Oliver Hazard Perry Commodore U.S.N.
Matthew C. Commodore U.S.N. Opened up Japan
Jane Slidell
Alexander S. Mackenzie Commander U.S.N.
Jno. Rodgers b. 1771 Rear Admiral
Minerva Denison
George b. 1787 Commodore U.S.N.
Anna Perry
naval officers
Matthew Captain U.S.N.
Sarah Perry
Robt. Rodgers Colonel
John b. 1818 Rear Admiral
Henry Lieutenant U.S.N.
lawyer
d. young
Christopher Perry Rodgers b. 1818 Commodore U.S.N.
Julia Slidell
John Rodgers Captain U.S.N.
George W. Commander U.S.N.
Alexander U.S.A.
Fredk. Rodgers b. 1842 Rear Admiral
John b. 1848 Rear Admiral
John F. Rodgers Captain U.S.A.
Thomas Lieutenant U.S.N.
Raymond Rear Admiral

FIG. 1

Pedigree chart of The Perry-Rodgers complex of naval officers. Black symbols indicate men who were either naval officers or captains in the merchant marine. An × in the symbol means a military man. Generations numbered at the left hand margin.

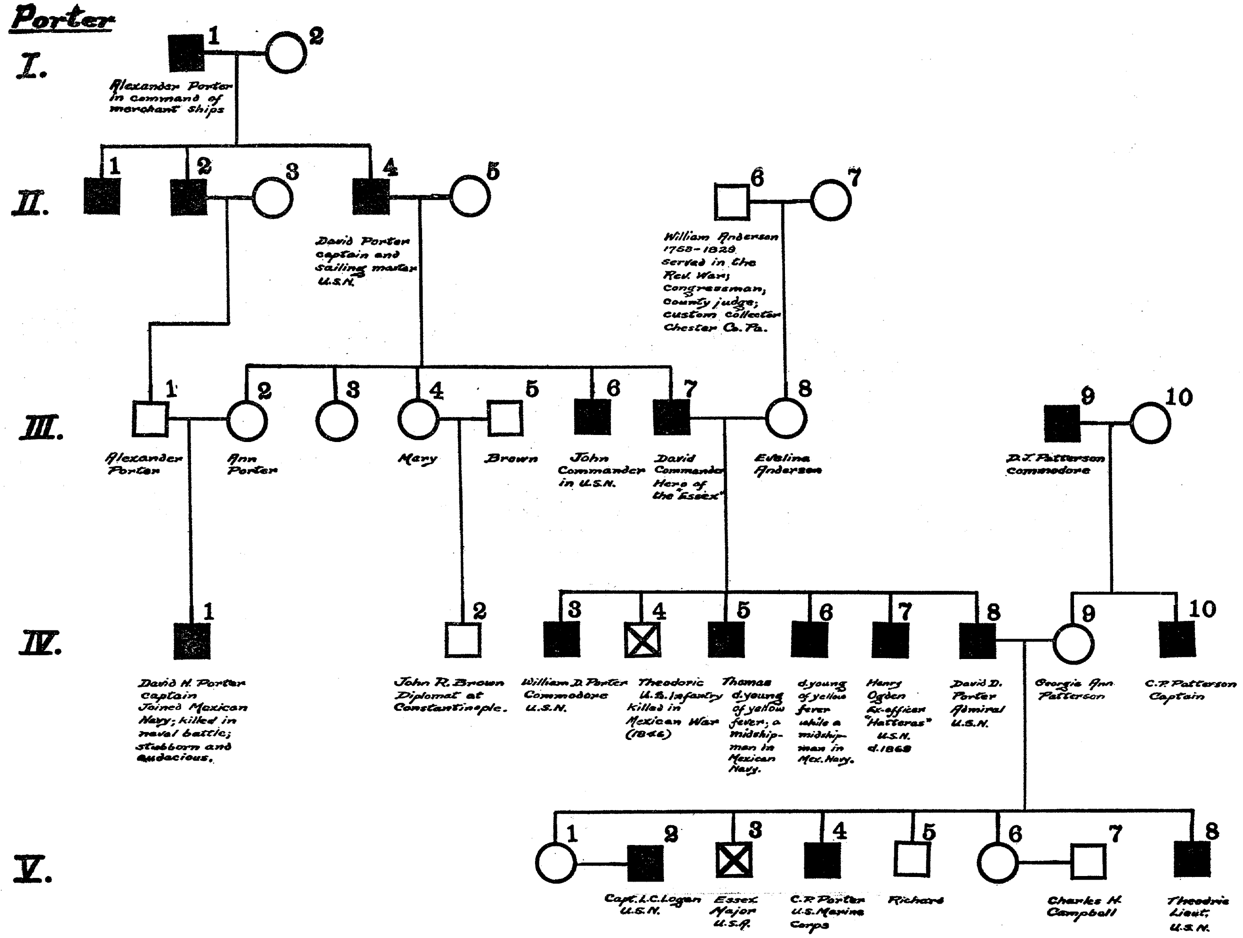
Porter
I.
II.
III.
IV.
V.
Alexander Porter in command of merchant ships
David Porter captain and sailing master U.S.N.
William Anderson 1758-1828 served in the Rev. War; Congressman; county judge; custom collector Chester Co. Pa.
Alexander Porter
Ann Porter
Mary
Brown
John Commander in U.S.N.
David Commander Hero of the "Essex"
Eveline Anderson
D.T. Patterson Commodore
David H. Porter captain Joined Mexican Navy; killed in naval battle; stubborn and audacious.
John R. Brown Diplomat at Constantinople.
William D. Porter Commodore U.S.N.
Theodoric U.S. Infantry Killed in Mexican War (1846)
Thomas d. young of yellow fever; a midshipman in Mexican Navy.
d. young of yellow fever while a midshipman in Mex. Navy.
Henry Ogden Ex-officer "Hatteras" U.S.N. d. 1869
David D. Porter Admiral U.S.N.
Georgie Ann Patterson
C.P. Patterson Captain
Capt. L.C. Logan U.S.N.
Essex Major U.S.A.
C.P. Porter U.S. Marine Corps
Richard
Charles H. Campbell
Theodric Lieut. U.S.N.

FIG. 2

Pedigree chart of the Porter family of naval officers. Symbols as in figure 1.

generation—it is indicated by energetic activity, push and marked emotional output; (*4*) *absence of fear*, such as permitted Perkins at 6 years to drive, tied in a sleigh, 10 miles and back to town to meet an emergency; or Maffitt at 10 years to travel alone with a ticket on his coat from North Carolina to White Plains, N. Y., in the days of stage coaches; or Winslow, at 10 years, to set to sea in a skiff, with a young cedar tree for a sail, from which he was rescued by an incoming vessel. Important also is (*5*) *ability to command men.*

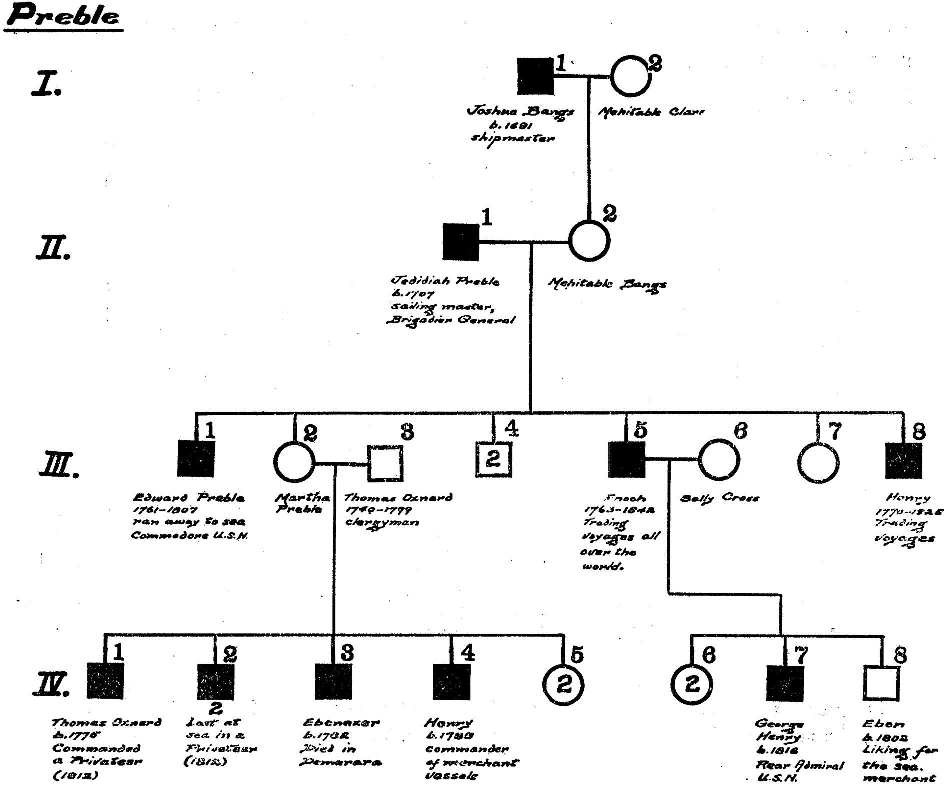

FIG. 3

Pedigree chart of the Preble family. Commodore Edward Preble, U. S. N., is at Generation III, No. 1.

An analysis of these 14 cases of naval fighters shows that all of those about whose youth data could be obtained (11) were adventurous, nomadic, fearless or "quarrelsome." Such then are the juvenile reactions of future successful naval fighters. In temperament 10 were hyperkinetics, 2 hypokinetic, 1 mixed and 1 calm. The hyperkinetic is the commonest reaction of successful naval fighters; but some of the greatest naval men, like Nelson, have had the somber spirits and the thoroughness of the hypokinetic.

As to family history, there is a record of the *brothers* in 8 cases. In 5, one or more brothers were active in the army or navy, 1 had a nomadic brother; 2 had brothers not especially noteworthy. The *Father*, in 3 cases out of the 14 was a legal man, in 2 cases agricultural, in 2 medical; 1 each was a merchant, inventor, evangelist, 2 were temporarily in the army, 1 was a purser in the navy and 1 was a naval officer (Admiral Porter's father). *The Mother's Father*, is described in 8 cases. One was a naval officer; 1 was a sailor, 3 were in the army and 3 apparently stayed at home. A *Mother's brother* is described in 5 cases: 1 admiral, 1 sea captain, 1 seaman, 1 "dare-devil," and 1 in parliament.

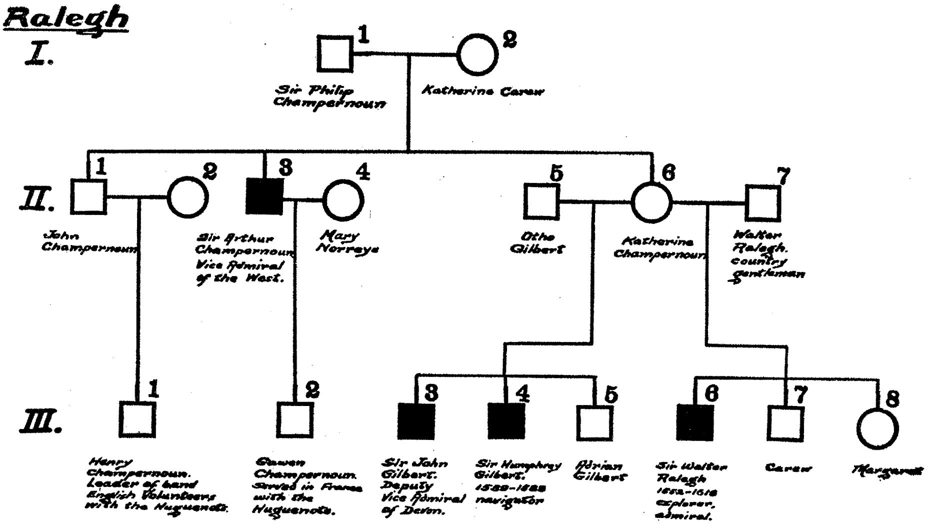
Ralegh
I.
1
2
Sir Philip Champernoun
Katherine Carew
II.
1
2
3
4
5
6
7
John Champernoun
Sir Arthur Champernoun Vice Admiral of the West.
Mary Norreys
Othe Gilbert
Katherine Champernoun
Walter Ralegh. country gentleman
III.
1
2
3
4
5
6
7
8
Henry Champernoun. Leader of band English Volunteers with the Huguenots.
Gawen Champernoun. Served in France with the Huguenots.
Sir John Gilbert. Deputy Vice Admiral of Devon.
Sir Humphrey Gilbert. 1539-1583 navigator
Adrian Gilbert
Sir Walter Ralegh 1552-1618 explorer, admiral.
Carew
Margaret

FIG. 4

Pedigree chart of naval officers in descendants, by two husbands, of Katherine Champernoun, the sister of Sir Arthur Champernoun; namely, Sir John Gilbert, Vice Admiral; Sir Humphrey Gilbert, the navigator; and Sir Walter Raleigh.

The conclusion from this study is first; the future fighting naval officer has, in childhood, a history of adventuresomeness and fearlessness. His *mother's* close male relatives (father, or brother, usually) show love of the sea, of travel and of adventure. Some of them are apt to be successful fighters. The hyperkinetic tendency shows in either father or mother. If the father is a naval man and the mother of naval or nomadic stock the chances of a combination for success of the son as a naval fighter are increased. The nomadic and adventurous traits of the great naval fighters are usually carried in the female fertilized eggs only. Therefore the sons of the daughters, or sisters, of successful naval fighters are more apt to be successful naval men than are the sons or the sons' sons of fighters, unless (as often happens) these fighting fathers marry daughters or sisters of naval men.

Hyperkinesis in either parent gives a favorable prognosis for naval success in the son: but some of the very best naval fighters have been hypokinetics and, under modern conditions of naval warfare, this type is less handicapped than formerly.

Four typical family pedigrees are annexed.

List of the 14 naval officers utilized in this study:—

Bainbridge (U. S.), Barney (U. S.), Cushing (U. S.), Cochrane (Eng.), Paul-Jones (U. S.), Lawrence (U. S.), MacDonough (U. S.), Keppel (Eng.), Maffitt (U. S.), Morris (U. S.), Perkins (U. S.), Porter (U. S.), Battnall (U. S.), Wolsely (Eng.).

THE TRIPLET SERIES OF RADIUM

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Communicated by G. E. Hale, May 2, 1917

Many attempts have been made to establish a relationship between the spectra of elements and their atomic weights. Referring to the doublets which occur in the first and second subordinate series, Runge and Precht[1] stated the following law. "In each group of chemically related elements the atomic weight varies as some power of the distance apart of a pair." They applied this law to the group of alkaline earths, and when they plotted the logarithm of the frequency difference of the pair series in each element against the logarithm of the atomic weight they obtained a straight line which gave by extrapolation an atomic weight of 257.8 for radium. As this was too large a value Ives and Stuhlmann[2] replotted the results of Runge and Precht using the atomic number in place of the atomic weight. Although their results were in general more consistent the atomic number found for radium was 96 instead of 88.

Now the elements of the second group of the periodic table are characterized by the presence of both doublet and triplet series of the principal, first, and second subordinate types. On plotting the logarithms of the atomic numbers against the logarithms of the frequency differences between the extreme members of the triplets we found that alternate elements fall on straight lines as in figure 1. Therefore the triplets of radium should fall on a line with calcium, strontium, and barium. The